Academic Organizer for Mobile

By

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Dissertation submitted in partial fulfilment of

the requirements for the

Bachelor of Technology (Hons) in

Information and Communication Technology

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CERTIFICATION OF APPROVAL

ACADEMIC ORGANIZER FOR MOBILE

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A project dissertation submitted to the
Information and Communication Technology Programme
Universiti Teknologi PETRONAS
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Approved:

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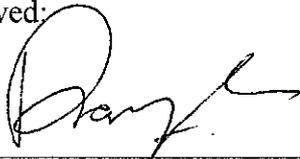
Mr. Anang Hudaya Muhamad Amin
Project Supervisor

UNIVERSITI TEKNOLOGI PETRONAS

TRONOH, PERAK

JUNE 2006

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

SITI SARAH BINTI MD JONID

ABSTRACT

This Final Year Project is about **Academic Organizer**, where a system that is developed using J2ME programming with SOAP and XML and SQL server as database. The main focus of **Academic Organizer** is to check the availability of the lecturers in UTP for students' information for their academic purposes. Besides, they can also set the appointment with the lecturers and check the schedule of the labs. Lecturers could also make announcements and approve the appointments. All these function can be implemented in their handphones or PDAs. Students go to their related building according to their programmes, to see their lecturers for academic purposes or other purposes. However, sometimes the lecturers are not in their office and time is wasted here. This project is divided into two parts. The first part is the research on how to implement this project by searching the information and knowledge from journals, articles and reference books. Second part is the development part of this project using incremental model. The benefits of implementing this project are about its flexibility and mobility because mostly people carrying their handphones or PDAs everywhere and any information could be accessed nowadays. In fact, this application could be applied and will be very useful, especially for the future purposes as the technology is grown rapidly nowadays.

ACKNOWLEDGEMENTS

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LIST OF ABBREVIATIONS

UTP	Universiti Teknologi PETRONAS
FYP	Final Year Project
WAP	Wireless Application Protocol
WWW	World Wide Web
WLAN	Wireless Local Area Network
XML	Extensible Markup Language
SOAP	Simple Object Access Protocol
PDA	Personal Digital Assistant
J2ME	Java 2 Micro Edition
PC	Personal Computer
IT	Information Technology.
IS	Information System
IRC	Information Resource Centre
HCI	Human Computer Interaction
MPP	Majlis Perwakilan Pelajar
RCSU	Residential College Student Unit

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

Advances in wireless networking technology have engendered a new paradigm of computing, called mobile computing, which is users carrying portable devices have access to a shared infrastructure independent of their physical location. This provides flexible communication between people and continuous access to networked services. Mobile computing enables the creation of a new class of distributed applications that seek to leverage on the important benefits of mobility, while providing unconstrained and continuous accessibility to information. With the explosive growth of the Internet, driven largely by the popularity of the WWW, there is a natural desire for the delivery of Web accessibility over a mobile environment. The WAP system is a good example of accessing Web information over a wireless network in a mobile environment by employing existing cellular technology that bridge to the Internet. In general, the underlying technologies driving the WWW are largely based on the assumption of wired communication. Here, the challenge for wireless is to seamlessly extend existing wired applications and data to a wide variety of mobile devices and platforms.

The origins of wireless communications date back to the 1890s with Marconi's work in radio and wireless telegraphy. Since then, advances have come through a sequence of discoveries and advancements. In 1898, Marconi produced the first commercial radio service, which is only data linking a radio transmitter with a receiver over 7.5 miles away. In December of 1900, the first voice radio link was demonstrated. Radio communications were of natural interest to the shipping industry, and the government established ship to shore communications requirements in 1910. By 1918, 5700 ships had wireless telegraphy. In the 1980s, the Regional Bell Operating Companies (RBOC) emerged after the breakup of the AT&T, and they began to offer low-data

rate wireless text services for pagers. Cellular Digital Packet Data (CDPD) and Mobitex were data services that used a packet data network based upon cellular structure. During this period, a wave of new analog cell phones and service options became widely available and affordable. In the 1990s, digital signal processing led wireless advances that supported more efficient used of bandwidth, new waveforms, and smaller devices that consumed less power. One of the early Pioneers, Unwired Planet convinced Nokia, Eriksson and Motorola to create the WAP forum. In late 1997 WAP 1.0 was released but uptake was slow. The uptake of other wireless technologies such as Bluetooth and WLANs was also slower than expected. This is because the high price for the new technologies at that time did not enable the users to move into the mass market and also the user experience for WAP was negative, which was due to the simple fact that the users were used to a colored fast display on their PC and hardly in adapting using a black and white four line display over a slow connection. Moreover, the users were uncertain about the security of the wireless communications.

Based on this occasion, an idea about turning a web service into a mobile phone tends to be realized in a project known as **Academic Organizer**. Basically, the project is to develop system that installed in students' and lecturers' mobile. There are two modules, which are students' and lecturers', definitely different functionalities but still to fulfil the same objective which is to check the availability of the lecturers. For the student's module, they can check the availability of the lecturers, set the appointment with them and also check the schedule of the labs. On the other hand, the lecturer's module could approve the appointment with students and make announcement, beside cooperate with the student's module in working their availability.

Web services consist of a service provider and multiple consumers based on the client-server architecture. Each Web service uses a custom communication protocol for the clients to access the servers. The most common access pattern for a Web service consists of requests and responses. The client sends to the server a request message that specifies the operation to be performed and all relevant information to perform the operation. The server performs the specified operation and replies with a response message. The actions carried out by the server might result in permanent

changes to the state of the server. XML-based standards provide globally recognizable protocols for discovering, describing, and accessing the custom interfaces of Web services.

SOAP specifies a standard for sending messages between different entities of a Web service. SOAP messages are XML documents that are transported from one SOAP node to another. For Web services, the SOAP nodes could be either the client or the server.

The two modules are joined by the proxy server. A proxy server is a kind of buffer between the mobile and the Internet resources or information that been accessed. The data that been requested come to the proxy first, and then it will transmit the data to the mobile

Figure 1 show the summary of Academic Organizer function, which is Mobile Host 1 is student mobile and request message from the server via proxy server. While Mobile Host 2 is lecturer mobile that will send any information related to the server.
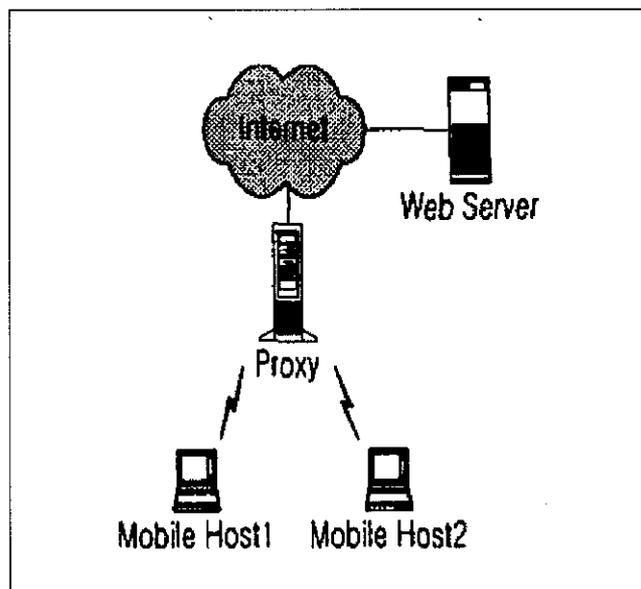
Figure 1.1: Summary of Academic Organizer function

1.2 PROBLEM STATEMENT

1.2.1 Problem Identification

With globalization in mind, a lot of people tend to be very concerned about mobility and flexibility in our life as there are many things need to be considered and should be done and delivered on time. To some extent, time is considered as one of the constraints that contribute to incompletion and the failure of achieving the result or goals required for any given jobs and tasks. For example, a student needs to see the lecturer of the related subject. However, the time is wasted when the lecturer is not in and the student is already arrived at the office. Therefore, it is relevant to develop and produce an application that may help students and lecturers to save their time for the academic purposes.

1.2.2 Significance of the Project

In campus life, students have to attend lectures, tutorials and lab sessions. Instead attending all the classes, they sometimes need to see the lecturers for academic purposes. For example, need to ask in understandable subjects taken, final year project and many more. Based on the problem statement, they might need a device with application that can help them to collect any important information with high efficiency and effectiveness in term of time, flexibility and cost. For example, students could check the availability of the related lecturers or lab that is free from their mobile, which is handphone or PDA.

This is where **Academic Organizer** could take place in which the proposed solution may help to resolve some of the issues arise and also provide another alternative for the students to make their live better and easier. On the other hand, it is believed that the **Academic Organizer** will give benefit and useful for both students and lecturers as it is affordable.

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1.3 OBJECTIVE AND SCOPE OF STUDY

1.3.1 Objectives

Basically, the objectives of the project are as below:

1. To check the availability of the lecturers in their office in UTP.
2. To organize appointment between lecturers and students.
3. To read announcements and news in UTP
4. To view UTP's academic calendar
5. To save student's time.
6. To make student's life easier.

1.3.2 Scope of Study

Basically, this project will be catered needs for two groups of users, which are students and lecturers. This happens when students would like to check the availability of the lecturers for academic purposes. Both students and lecturers need to cooperate to make sure that any information or announcement that academic related will be delivered. Therefore, the Academic Organizer project may offer new alternative to the users as a simple application in which can be used and carried out within their own mobile phones. In other word, this project will bring a new perspective to the users for them to see from technology point of view.

Mainly, the scope of this project is covered several aspects such as the size of participating lecturers and the research for both technical and social information. The first aspect that is looked into is the size of this project, whether it should be done for all programms or limited to IT/IS lecturers, just at the beginning.

The second aspect is the usage of research. Technically, the research covers researching the theories and literature reviews, technology, extensive Java coding, which is J2ME programming and SOAP and XML coding. The project should handle its mobility and flexibility. Furthermore, social research is done by determining how the users' acceptance of the technology and the user-friendliness of the system.

CHAPTER 2

LITERATURE REVIEW / THEORY

2.1 THE IMPORTANCE OF MOBILITY NOWADAYS

"Two trends are observable. First, wireless technologies such as GSM/GPRS, UMTS, WLAN, and Bluetooth are making bandwidth more and more inexpensive. Wireless bandwidth is continuously increasing as well as the mobile Internet subscriber. The second trend is the increase of processing power and device capabilities. Mobile and handheld devices are often more powerful than personal computers of the '90s. They provide features like digital photography, speech recognition, personal information management (PIM), and gaming." **By Guido Gehlen, Linh Pham (2004)**

From this review, we could clearly see that hand phones and PDAs will be among the important devices nowadays. From time to time, software that will be supporting these devices will be grown rapidly, according to its functionalities and demands. Demands for this new technology will be more to wireless communications, depends on the situations and the usability from the users. For example, WAP, WLAN and Bluetooth are also widely used in this communications era, especially for transferring data and to get the information. In fact, it is not surprising that the related technologies are become cheaper.

2.2 BENEFITS WEB SERVICES WITH WIRELESS DEVICES

In **An Approach to Lightweight Deployment of Web Services (2002)**, web services can be described as *"autonomous, modular applications, which can be run over the Internet towards performing a specific business task."* Moreover, these services conform to a specific technical format easing their invocation and use over the WWW, as well as their combination towards completing more complex business processes. For example of a web services are a ticket reservation service, a yellow pages directory service, a language translation, or even a service calculating medical claims.

Web Services deployment is expected to have several positive implications on corporations, end users, operators and service providers [13]. This is due to the fact that this paradigm provides platform and vendor independent descriptions of services, thus enabling interested parties to discover and exploit services, independently of enabling technologies and hosting platforms. A rich set of resulting benefits is straightforward. Some of the benefits are integration efforts are minimized due to the common service format, while the tasks of publishing, registering, finding and utilizing business services become easier. In fact, the task of constructing new business applications can be completed in a timely and cost effective manner. As a result, innovative products and value added services featuring minimal time-to-market can be developed and delivered. Operational costs are lower because corporations need to operate and administer only a small portion of services. Development costs are also minimized, since several components are developed only once and reused in the scope of various business applications. Furthermore, adaptation and customization of business applications to new requirements and specifications is rendered easier that ever before. Finally, corporations can enjoy increased service reliability by simply deploying multiple instances of the necessary Web services.

Based on the benefits mentioned before, therefore web services are also growing fast in this era. This is because web services are considered as reusable software components over the Internet. As they are not limited to one environment, but also

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could be integrated into any software-system that is web service- aware. In fact, new web services are added continuously added and to be linked to existing web services. This can be proven by the quote of the literature review below.

"In today's e-commerce environment, various commercial and other organizations provide their services through the web. A single business transaction therefore invokes a number of web services. Web services provide a conceptual foundation and a technology infrastructure for service-oriented computing. It allows program written in different languages on different platforms to communicate with each other in standard-based way." **Johnson P Thomas, Mathews Thomas, George Ghinea (2003)**

In fact, web services are nowadays collaborate with the wireless devices. Web services enable the exchange of data and the remote invocation of application logic using XML messaging to move data through firewalls and between heterogeneous systems. In fact, the programs written in any language, using any component model and running on any operating system can access XML Web Services. To relate with this project, SOAP and XML based web service is developed using J2ME programming through proxy server to make the users could access the services. The relevant of developing this project can be supported by **Johnson P Thomas, Mathews Thomas, and George Ghinea (2003):**

"XML Schema (XSD) defines the message format which describes the type and structure of XML documents, Simple Object Access Protocol (SOAP) which is a lightweight XML based protocol for exchange of information in a decentralized, distributed environment. Web Services Description Language (WSDL) explains how operations can be invoked using particular transport protocol bindings and Universal Description, Discovery and Integration (UDDI) provides a mechanism for clients to dynamically find other web services."

2.3 THE USE OF PROXY SERVER

One of the important elements in this project is the proxy server. There are such advantages implemented using web services. One of them is that modification isn't necessary for client devices or Web servers, which is the workflow is similar to language translation services. [15]

"A user starts by entering a desired URL into the mobile device. The proxy server fetches the corresponding Web page from the original server, and our algorithm adapts it. The client receives the thumbnail view, with the sub pages cached on the proxy server. When the user follows the links on the adapted page, he or she is redirected to the proxy server, and a new request is generated if the page hasn't been cached. If the requested page doesn't exist, or if some other HTTP errors occur, the proxy passes the error message directly to the client."

In fact, the proxy server usually has a better Internet connection and a much faster processor than mobile devices do, which makes for faster page downloads and processing.

The proxy server is an effective place to cache web objects which otherwise experience long network latencies. It also helps reducing the network traffic and distributing the server load since the object only needs to be transferred once to the proxy and subsequent requests can be handled from the proxy [16].

2.4 ISSUES IN DEVELOPING JAVA APPLICATION USING MOBILE

Dmitry S. Kochnev and Andrey A. Terekhov (2003) [17] had stated that there are some of the unforeseen problems that not typical desktop Java development projects to deal with in creating applications for Java- enabled mobile devices. This is related with the platform's physical limitations, including:

- The size of the application and its data
- Intermittent network connections with lower bandwidth
- Small display size, which can cause problems for creating an acceptable user interface.
- Primitive facilities for inputting text information.

One of the Java technology's characteristics is its universal portability. However, ensuring J2ME application portability practically, is quite hard. This problem arises mostly because of the capabilities of various J2ME devices differ significantly. As an example, there are different screen sizes, both black-and-white and color screens with various color depths and many more. So from here, special care has to be ensured that the programs could work on more than one J2ME device. In fact, the writers of the journal had stated that J2ME portability problems could only be solved through strict standardization of the platform's numerous of parameters.

Another issue is that related with user interface. The user interface of the J2ME application is also important because it has richer interface capabilities than WAP but a smaller screen size and less processing power than a PC. Some of the actions that should be introduced in J2ME application so that the usability could be improved are quick search, automatic text completion features and so forth. The situation where the user has to wait for several minutes when the page is loading on her phone's screen should be prevented because the reliability of the application should be existed. As the user, especially using mobile, is not prefer to wait for a long time if the respected application or web site is taking too much time to access them.

Conclusion could be made that there is no single solution for all the problems existed as it depends on the situations, including the phone's physical characteristics and the mobile network's capacity.

2.5 EXAMPLES OF APPLICATION

In developing this type of project, many researches had been done before, especially for the application that using the same concept as the proposed topic. Applications are found, mostly in medical field as this field is important and high demand from the users. UCLA Medical Center [10] is piloting a mobile, wireless patient information retrieval system that gives physicians instant access from throughout the hospital and around the world to real-time patient data via wireless Personal Digital Assistants (PDAs) and cellular smart phones. The Global Care Quest system, or GCQ, is intended to improve access to patient data, save health care workers time, trim the cost of care and tighten patient safety standards. *"At UCLA, GCQ integrates with digital medical records, bedside charting and laboratory results, to create the most comprehensive digital medical data storage and retrieval system of its kind."*

Another example of application is from Drager Medical [11] that can remote access to patient cardiopulmonary information in near real-time. The goal of the remote access concept is to help hospitals increase quality of care by helping clinicians better serve their patients. Time consuming is the factor as patients are increased nowadays. In many situations, consulting physicians need to obtain patient information regardless of where they are at that moment. Based on its own problem statement, Dräger Medical had come out with their solution, which provides the tools that enable caregivers to better access their patients' cardiopulmonary status wherever and whenever they want - within the limits of the hospital intranet.

From this article, it is proven that such application could be developed depends on the objectives and the problem of the statement. Based on the application above, the proposed project has the same concept, which is students could check the availability of the lecturers from their mobiles and any request will be replied from data that locates in the database.

CHAPTER 3

METHODOLOGY / PROJECT WORK

3.1 PROCEDURE IDENTIFICATION

This project is executed in two phases; first semester and second semester.

3.1.1 First Semester

This phase has been completed successfully. This stage was crucial since all works is concentrated on the research, literature review and collecting data. Particularly, the author has the idea and the methods on how to implement this project for the next semester by the end of the first semester. However, further research is done on the methodology part, especially which related with SOAP and XML. The information is obtained from the reference books from the library, journals and articles from the Internet as the author has to learn the new knowledge by herself, with the supervision from her respected supervisor. Technical data and information is used to support any justification.

3.1.2 Second Semester

This stage covers more area compared to the previous stage. As for the second semester, the chosen topic is implemented based on all the information, literature reviews and theories that had collected from the first semester. In addition to that, time will be allocated in developing skills in using J2ME programming with SOAP and XML based. Since SOAP, XML and J2ME are new to the author, more time has to be spent to learn and gain knowledge about these three important elements for this project. Additionally, the data will be stored in data base using SQL server. By the end of the semester, it is scheduled that the author comes out with the conclusion and the product in meeting the requirements before.

3.2 SOFTWARE DEVELOPMENT

Basically, the project is developed using the incremental development, where this project specification, design and implementation is broken down into a series of increments, which are developed in turn. The methodology is used as guidelines in completing the project. This type of development is chosen because lower risk of overall project failure, meaning that although problems are encountered in some increments, some is successfully delivered and functioned. As the highest priority services are delivered first and later increments are integrated with them, it is expected that the most important system services receive the most testing. In fact, components by components are added and incremented by time. This methodology is a guideline in preceding this project. Other than that, extreme programming and building prototype is involved.

Phases of this methodology are as follow:

- Requirement planning phase
- Research phase
- Design phase
- Construction
- Evaluation
- Cutover
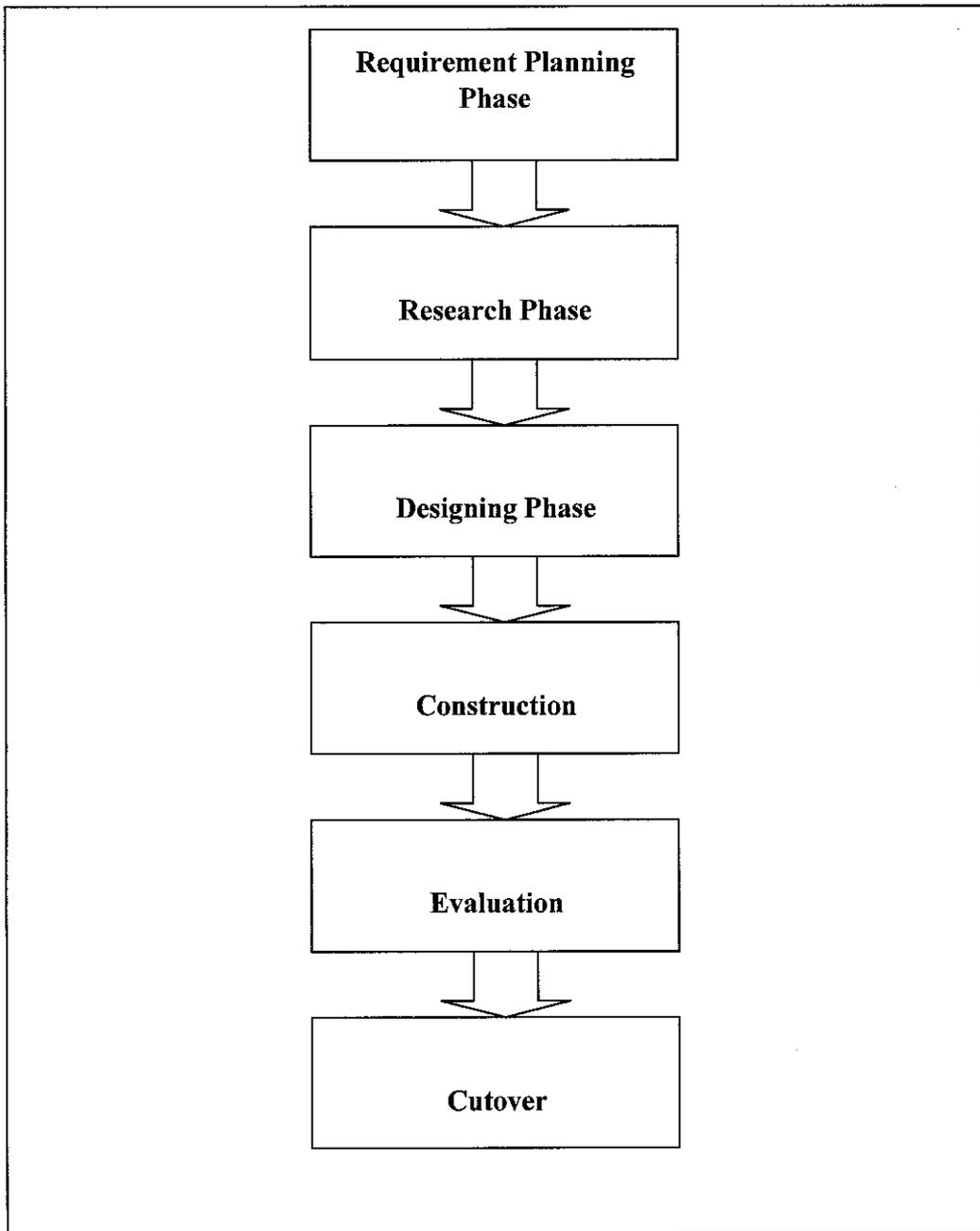
Figure 3.1: Methodology Framework

3.2.1 Requirement Planning Phase

The tools such as hardware and software are identified in this phase. There are several tools that can be used to build a J2ME application. However, NetBeans 5.0 has been selected because it is more user- friendly and easy to use.

Some of the functions and features of NetBeans 5.0 are:

- Version control
- Debugging
- Code completion
- Web services
- Web frameworks

3.2.2 Research Phase

In developing this project, the research phase is important as this is the basic part of this project. All the information and the knowledge that related in developing this project are gathered here. This phase is consisting of three sub categories.

3.2.2.1 Identifying the requirements

At this phase, identifying and analyzing the project requirements is done. Problem statement is created based on the author perspective in daily campus life. In fact, observation and informal interview is done especially with the author's colleague about the problem statement. From their perspectives, the needs and requirements are identified, collected and analyzed from the students' life that hectic, especially during the beginning of the semester and at the end of the semester, where they have to consult with their lecturers in solving their assignments and projects. They feel very stressful and tired, especially when the lecturers are not in when the students already at their office.

3.2.2.2 Doing research about this project

Research is done by reading and discovering the journals and articles from the library and Internet. Information and theories is found by reading the reference books. However, it is hard to find the reference books in the IRC UTP because J2ME is quite a new technology. So, the author had her researches by reading more journals and articles that related with the new technology and wireless.

3.2.2.3 Consulting with Supervisor

As the main idea of this project is basically from the author's supervisor, his advice and experts is needed to get the better idea about this project before the development phase. The consultation from the supervisor is also important for the author's understanding in guiding her, especially when the author has the uncertainty and unsure things on her mind about this project.

3.2.3   Design Phase

Design phase is focused on designing the interfaces and its implementation. Interfaces for the student's module and lecturer's module is different, depends on its functionalities. However, the design is changed from the first design as it is subjected to the project's needs and requirements. The interfaces are prepared so that the application will be more user-friendly so that the users could easily understand and know how to use this application.

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3.2.4 Construction

Next will be the implementation, which is the construction phase where the designed interfaces are developed using J2ME programming. In addition, the programming part is the main operation and crucial part at this stage. In connecting the application with the database and the proxy server, there are also some of the problems occurred as the author is the average student. However, the author is learnt and tried herself to make the application is working.

The application is developed from part to part and then there are several tests from time to time, especially in fixing the errors. Each prototype is examined until the final product is workable as what is planned from the previous semester.

3.2.5 Evaluation(User Acceptance Test)

The objective of the evaluation is to verify how accurate this application to the users. The test is conducted by the students and the lecturers because this application is involved in two modules. However, the author's assumption is that the lecturers result will be the same with the students based on the basic needs and requirements from the persons that stay in UTP and knows the basic of HCI knowledge.

There are three main objectives of the testing part with the users, which are:

- To assess the extent and accessibility of the application's functionality.
- To assess user's experience of the interaction of the application
- Identify any specific problems of the application developed.

The application's functionality is important in meeting the users' requirements. On the other hand, the design of the application should enable the users to use the application easily and the interfaces should be user- friendly. In addition to evaluate the application, it is also important to assess based on the user's experience of the interaction and the impact with the application. The aspects that need to be considered are how easy the application to be learnt by the users, its usability and the user's satisfaction. Another objective of the evaluation is to identify specific problems with the design. For example, the issues that may arise are ambiguity among the users, misconception of the used of application and unexpected results.

3.2.6 Cutover

The final phase consists of handover the project to the university, besides report preparation and final presentation for the external examiner. Other than that, weekly reports about the project need to be submitted. Other than that, the report after the final presentation will be corrected and hard bounded. The report then will be delivered to UTP.

3.3 TOOLS / SOFTWARE

There are several software and hardware that had used in completing this project:

3.3.1 Hardware

1. Intel or AMD Processor PC (1.5 GHz or above)
2. 284MB RAM (minimum)
3. Microsoft Windows Operating System.

3.3.2 Software

1. Development tool, which is J2ME programming using NetBeans 5.0.

   As Sun Microsystems advertised J2ME as a Java platform for all kinds of consumer and embedded devices, from phones to set-top boxes.

   Like regular Java, J2ME applications are portable and available on anything that runs a Java Virtual Machine. In fact, J2ME provides a complete application- programming framework for mobile devices. It also gives users control over their interface and direct access to their hardware platform.

2. Database component, which is SQL server.

3. Web services and protocols, which are XML and SOAP.

   XML protocol is integrated with SOAP for accessing web services. SOAP is already the most widely used communication protocol for web services. SOAP a powerful and rich language for exchanging information among other object – oriented systems. Since SOAP has gained mainstream support as a web services messaging standard, most other web services protocols must interoperate or bind with SOAP.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 RESEARCH RESULTS

Basically, the research part is done on the first semester. By the end of the first semester of FYP, the author has the idea of the project and could be summarized by using logical diagram such as process flow and the use case diagram.

4.1.1 Process Flow

Figure 4.1 shows that the flow of the process of **Academic Organizer,** which is the rough idea on how it works. Firstly, the student has to choose the respected lecturer and then the availability of the lecturer will be checked. If the lecturer is in the office, the student could see the lecturer straightly. If the lecturer is not in the office or UTP, the student could request for appointment with the respected lecturer. When the appointment is approved, the student could see the lecturer. If not, the student has to check the availability of the respected lecturer again.
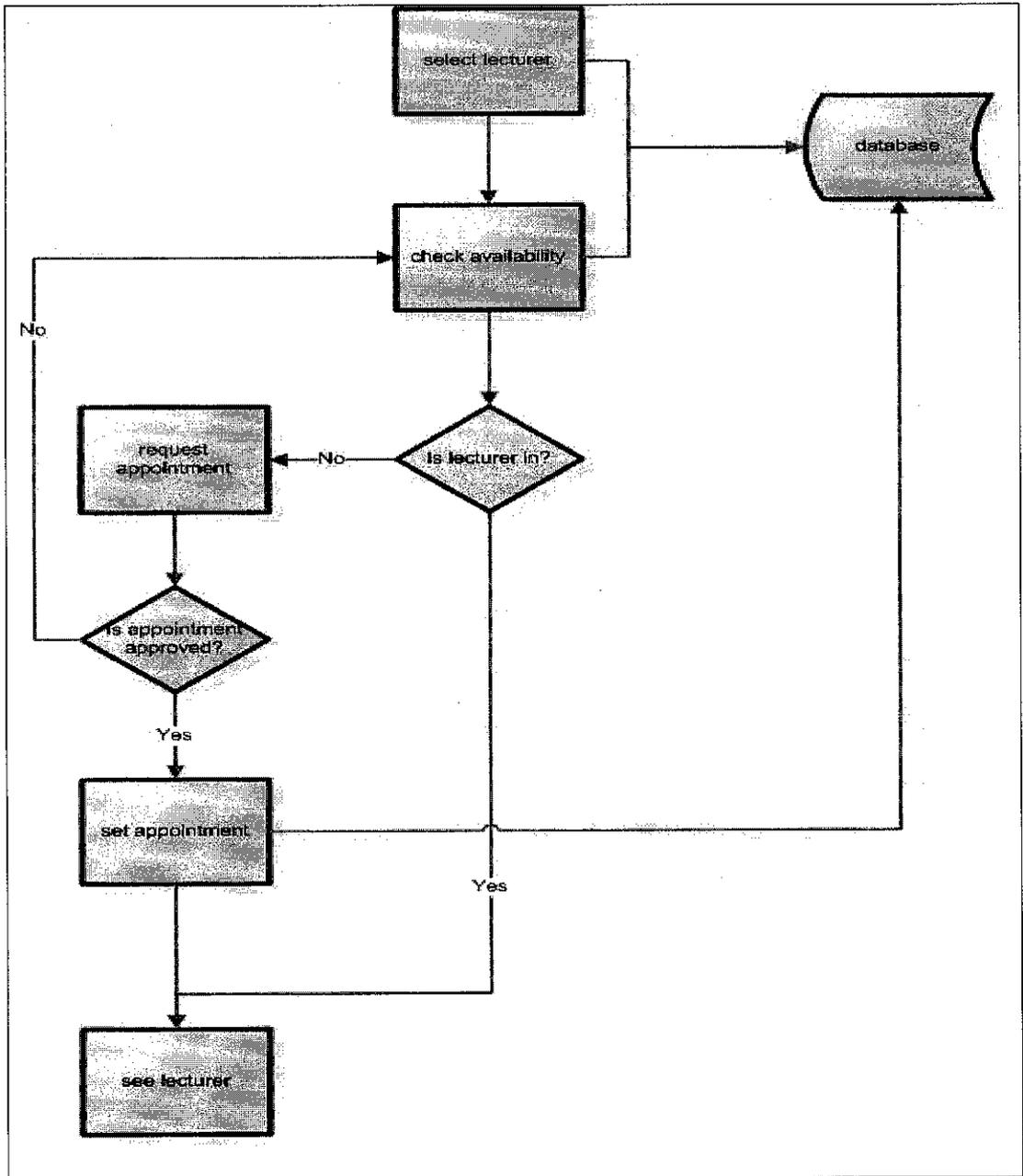
Figure 4.1: Process Flow of Academic Organizer

4.1.2 Use Case Diagram
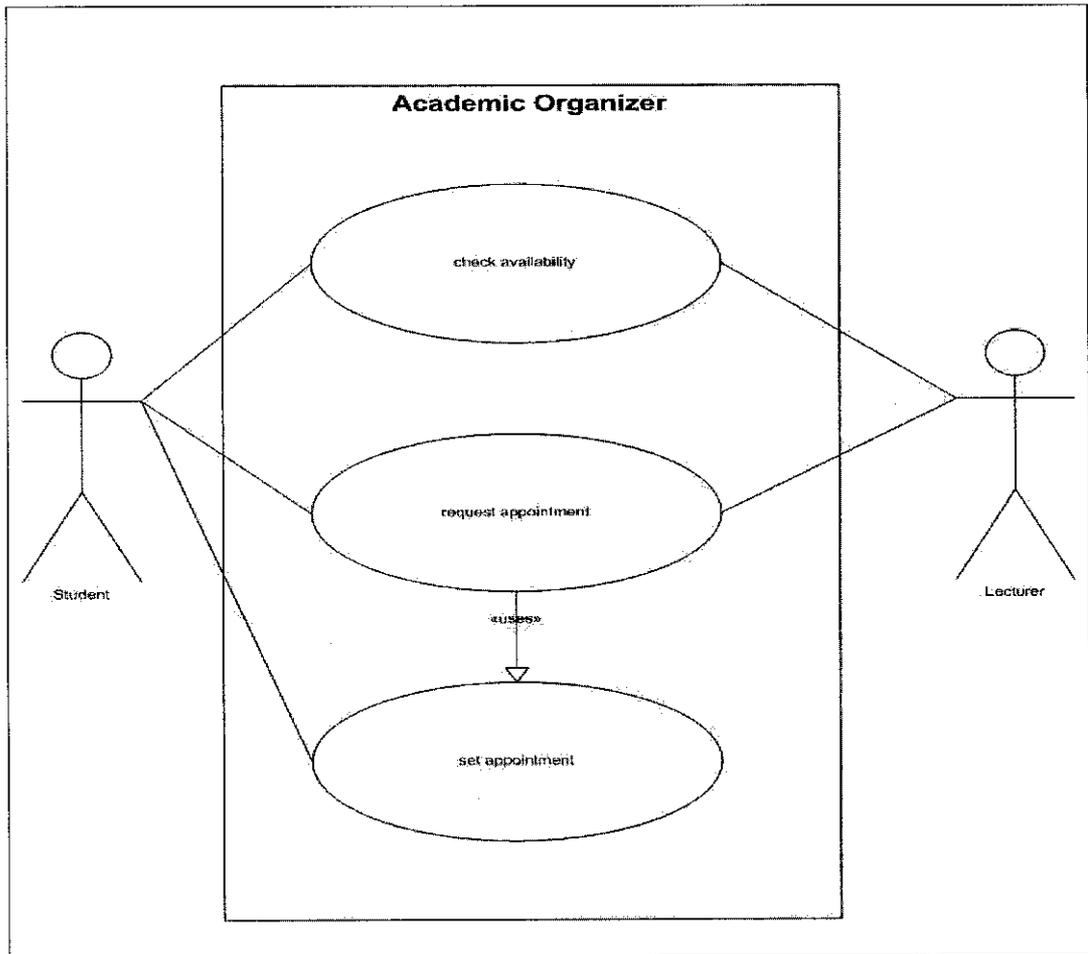
Figure 4.2: Use Case Diagram for Academic Organizer

Figure 4.2 illustrates more on behavior of **Academic Organizer**. Based on the use case diagram above, student could check the availability of the respected lecturer, whether they are in the office or not. If not, the student could also request for appointment with the lecturer. However, the lecturer has to approve first the appointment and then the student could proceed in seeing them. For lecturer module, there will be log in function for authorization of the appointments.

4.1.3 Sequence Diagram

Basically, the sequence diagrams are shown the same concept as the use case diagram and the flow chart. However, the sequence diagrams show more details about each task of the functionalities in the application.

From the Figure 4.3, the selection is shown when the users need to select to know the availability of their respected lecturers. Database is retrieved to show about the availabilities of the lecturers on the respected date. Then, the result is shown on the interface.

As the Figure 4.4 shows that the selection is made on the task of the appointment. After selecting the task, the appointment selection is chosen and the respected lecturer is chosen. Then, the date for the appointment with the lecturer is chosen first and will be sending to the database. From the database, the result will be known whether the lecturer had approved or not the respected date for the appointment. If not, the students have to choose again another date.
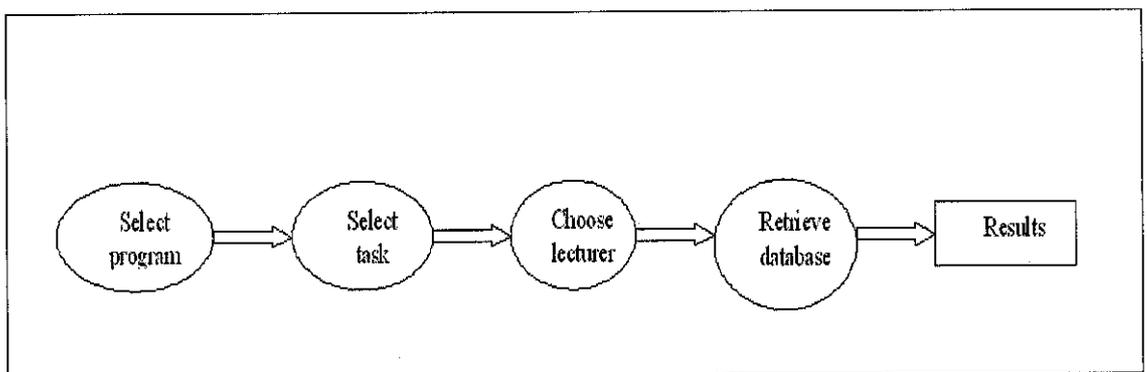
Figure 4.3: Availability of the Lecturers Selection Sequence Diagram
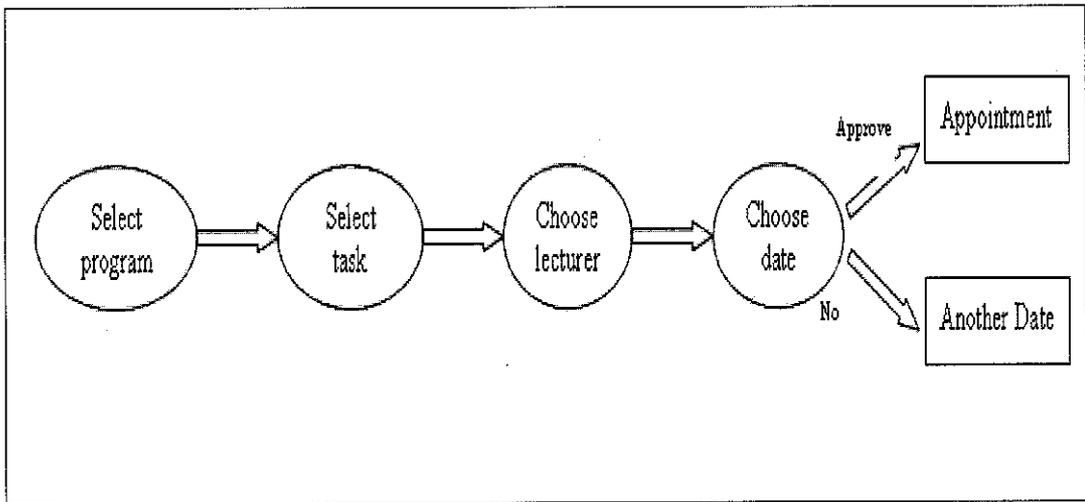
Figure 4.4: Appointment Selection Sequence Diagram
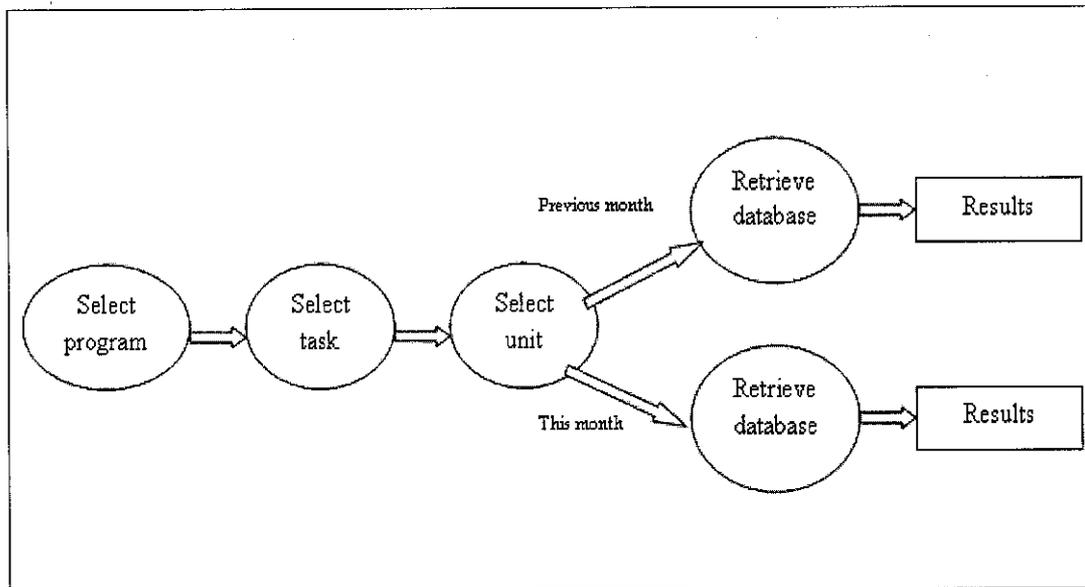
Figure 4.5: Announcement Selection Tree Diagram

From the Figure 4.5, the announcement selection part could be read from the sequence diagram. The students could make their choice to select the unit in UTP such as MPP UTP and RCSU as all these units related with students' life in UTP and they also would like to know things around them. Then, the related information and announcement will be retrieved from the database and displayed on the mobile of the users.

4.2 SYSTEM ARCHITECTURE
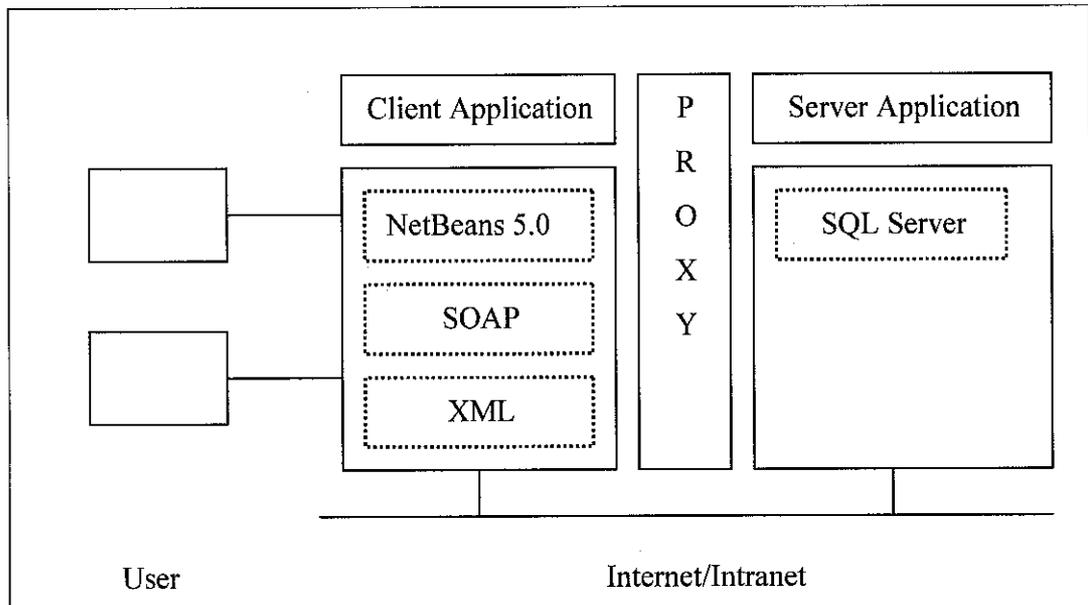
Figure 4.6: System Architecture for Academic Organizer

The system architecture for the Academic Organizer is shown in the Figure 4.6. It is divided into sub components, which are client application, the proxy and the server application. Client application is the user- end, where the user executes the application. Other than that, the server application is where all the data and the information that related with academics in UTP, especially that is contained in the client side application is located. The proxy server is where the temporary information that had been accessed by the users is located, so that the request does not have to go to the server side again.

4.2.1 Server Application

From the Figure 4.6 before, this application is used SQL server as database to locate all the information that relevant with the academic purposes in UTP, especially in the scope defined before that to check the availability of the lecturers and to arrange and organize appointments between the lecturers and the students. This service also enables the creation of a strong platform for network applications and communications and widely used too.

4.2.2 Client Application

As depicted on Figure 4.6, the client side needs, NetBeans that using SOAP and XML with J2ME programming. Since this application is developed to run in the mobiles, for the prototype, it will be running on the ordinary PC and from the emulator. For the real case that running in the mobiles, it needs micro browser that support J2ME programming like Symbian Operating System.

4.2.3 Proxy

A proxy server is a server that sits between a client application and a real server. It intercepts all the requests from the client to the real server if it can fulfill the request itself. If not, the request will be forwarded to the real server. From the Figure 4.6, the implementation of the proxy server is the same. The main purposes for using proxy is the performance of the application could be improved as the results of the requests could be saved of a certain amount of time. In fact, proxy server could also be used to filter the requests from the client before the real server. This is more to security purposes.

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4.3 FINAL PROTOTYPE PRODUCT

4.3.1 Student Module

The final prototype versions of this application are divided into two modules. The first part is the student's module and the second part is the lecturer's module.

Figure 4.7 shows that the screen shot from the student's module menu. First, the users have to choose their respective program, and then the task on what they want to know is after they had selected their program. The students are categorized with their respected program so that it is easier for them to choose their lecturers.

From the Figure 4.8, they could search for the information they want. For example, if they want to check the availability of their lecturer, they could select the lecturer menu and then will link them with the information from the database, which lecturer is in the office and available. On the other hand, they could also make appointments with the lecturer by selecting the appointments link. Other functions are they student could also get the new announcement and news from the unit in UTP such as RCSU and MPP UTP. The example from the list of respected lecturers in IT department could be seen in the Figure 4.9 as below.
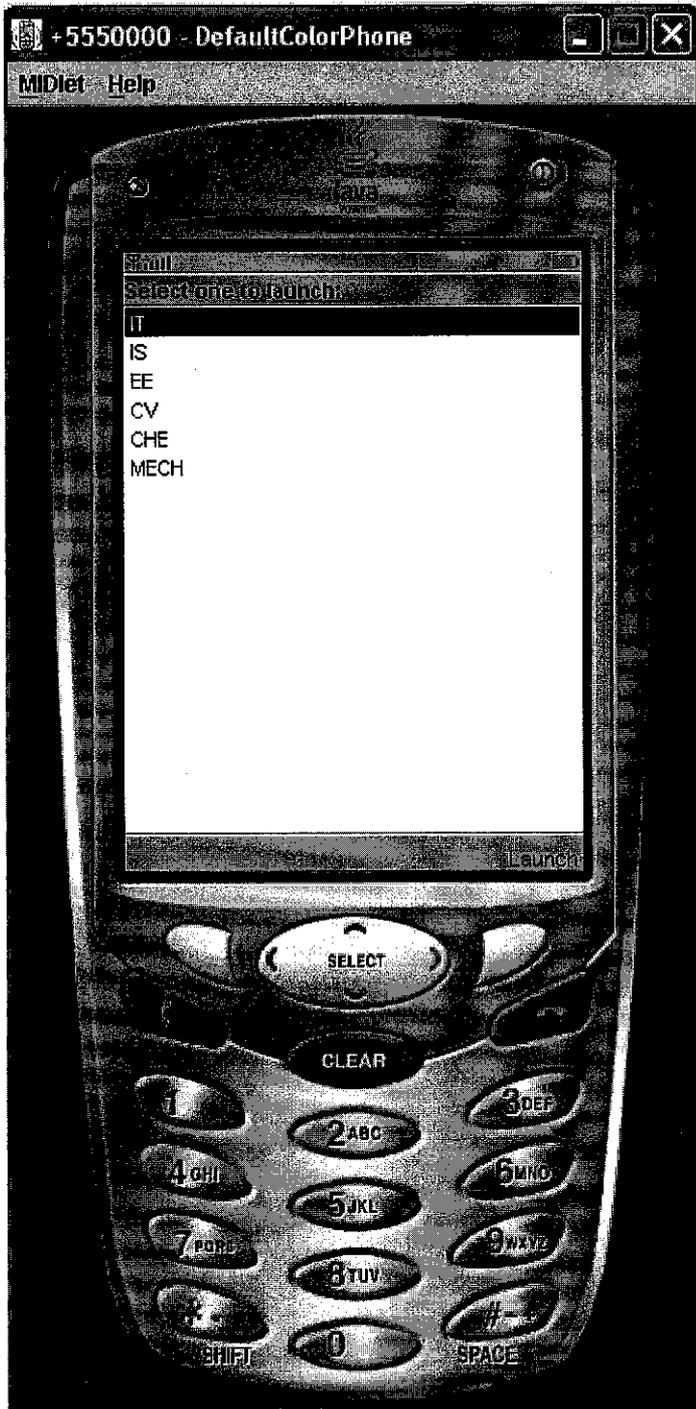
Figure 4.7: Screen Shot of the Students Module Menu
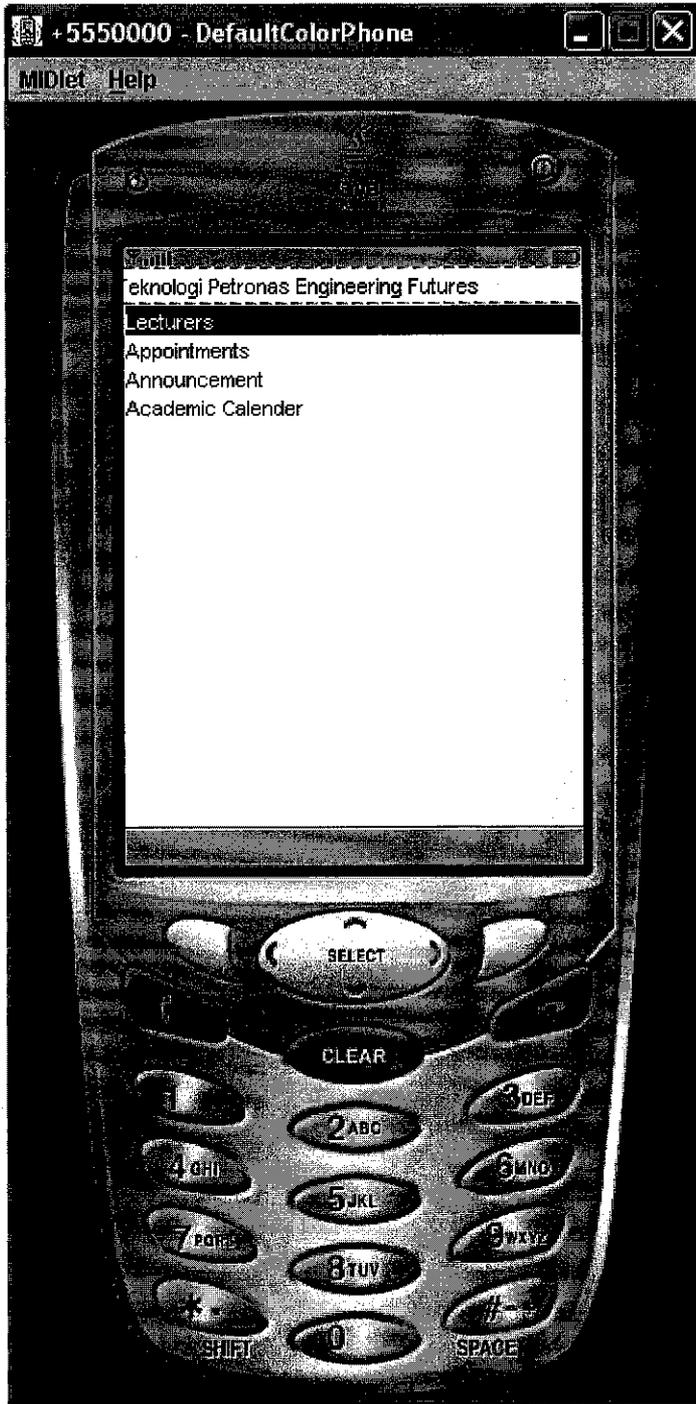
Figure 4.8: Screen Shot of the Selecting Task
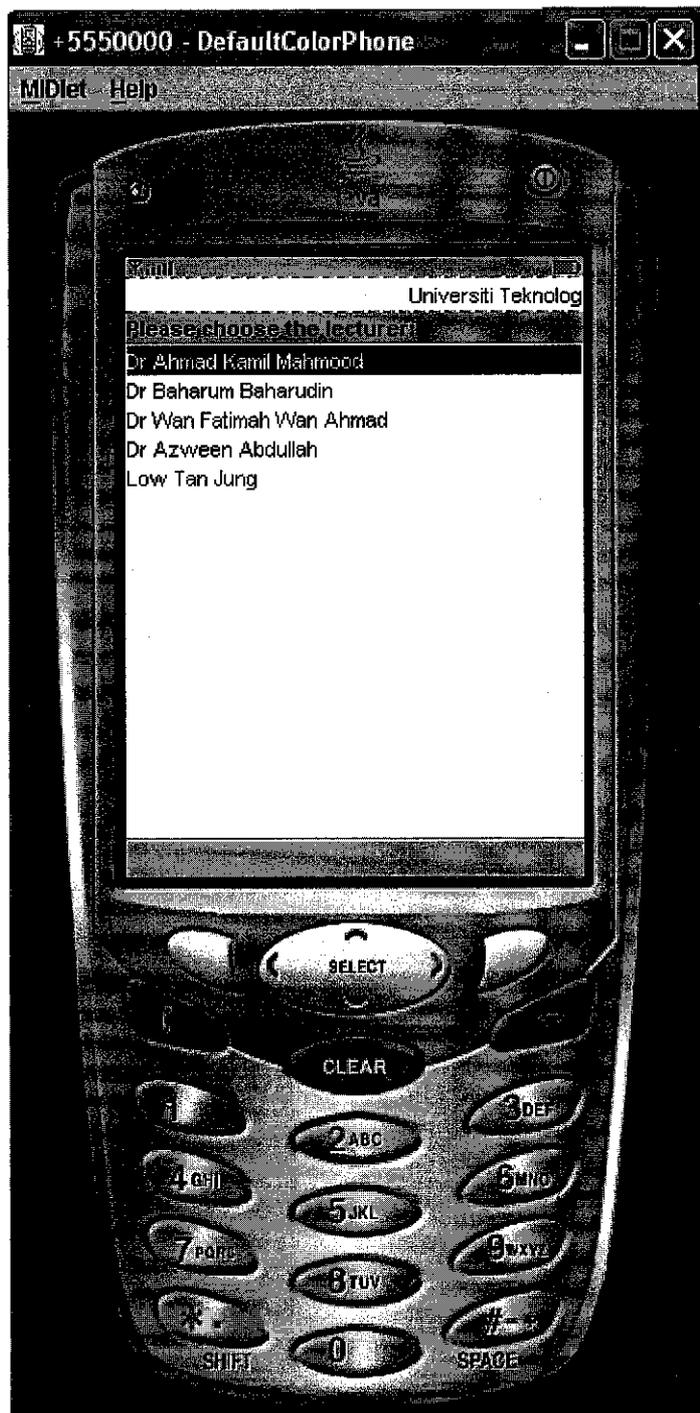
Figure 4.9: Screen Shot to Check the Lecturer

4.3.2 Lecturer Module

In the lecturer's module that could be seen in Figure 4.10, there are also four selections that the user has to choose, which are:

- Availability

- Appointment

- Announcement

- Academic Calendar

Figure 4.11 shows that the screen shot to inform the lecturer's availability in UTP. It is from the availability selection in the lecturer's module. From Figure 4.11, the user has to choose only one of the options whether they are in or out in office or UTP. Then, the option will be stored in the database.

For the second option, which is appointment, this is where the lecturer's approve their appointment that requested from the students. Then, they will approve or reject the requested appointments and the information will be stored in database.

Based on the Figure 4.12, the lecturer could also read the announcement and news that happens in UTP by each unit such as MPP UTP, RCSU and also Rakan Masjid. This function is categorized by the previous month and the current month.

For the Figure 4.13, the user could also view the UTP's academic calendar. This function is divided into two parts, which are the January semester and also July semester.
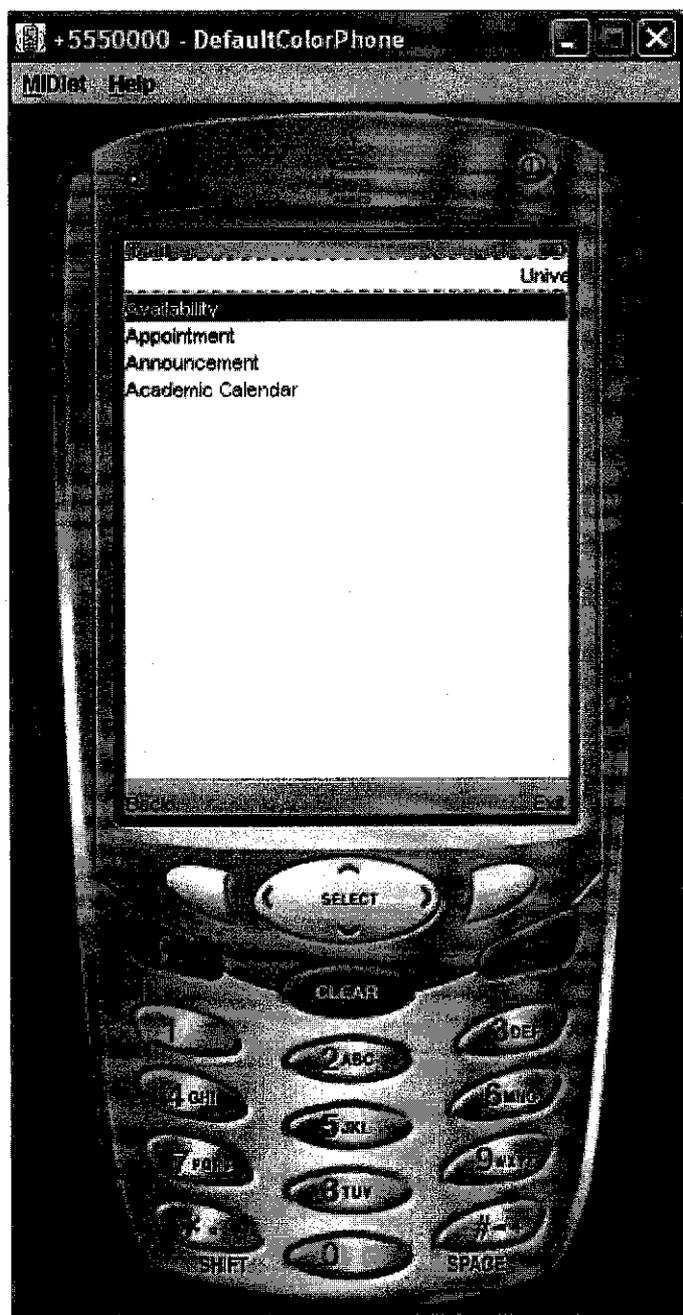
Figure 4.10: Screen shot for the Main Lecturer's Module
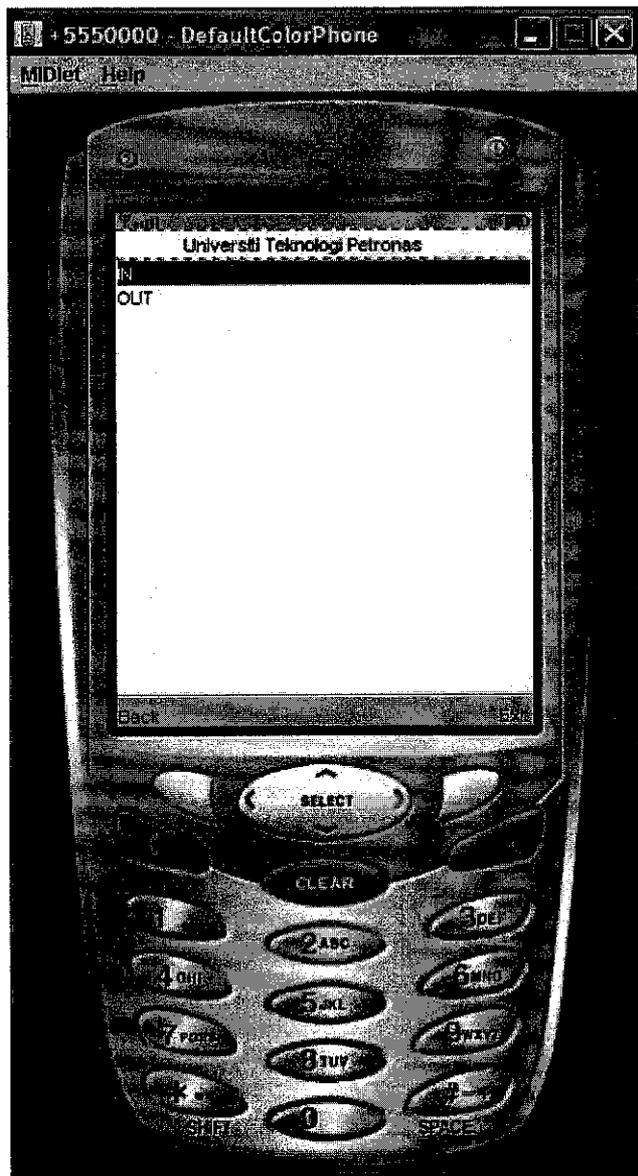
Figure 4.11: Screen Shot to Inform Availability
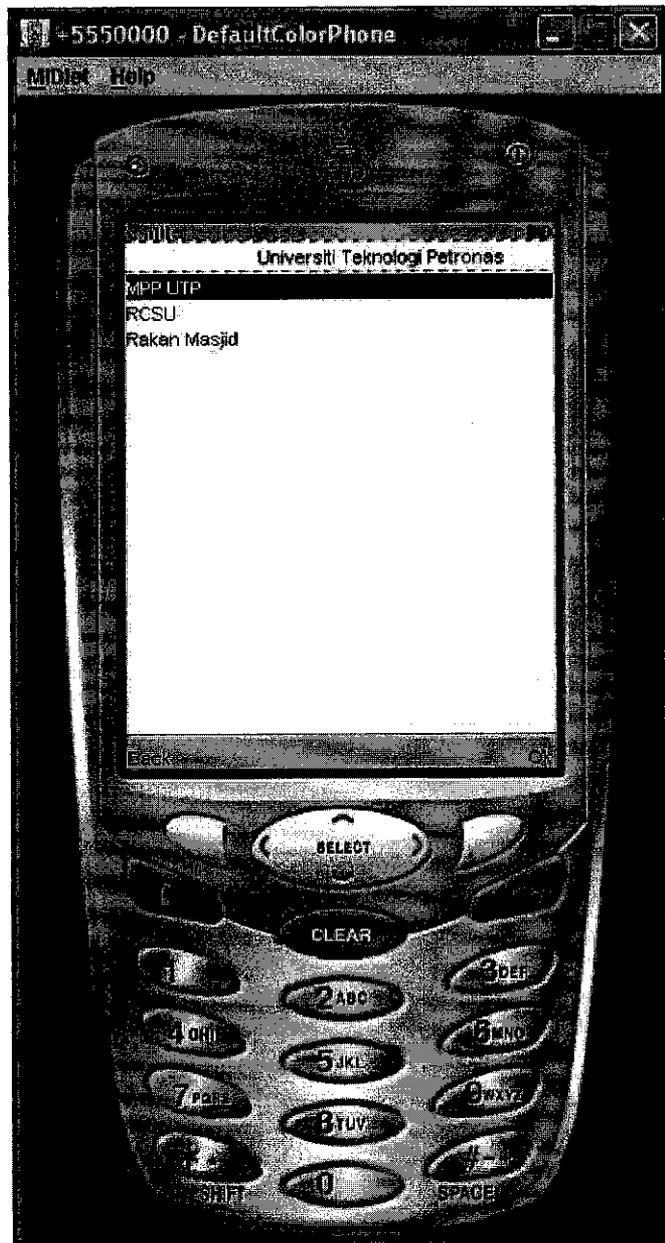
Figure 4.12: Screen Shot to Choose Units in UTP
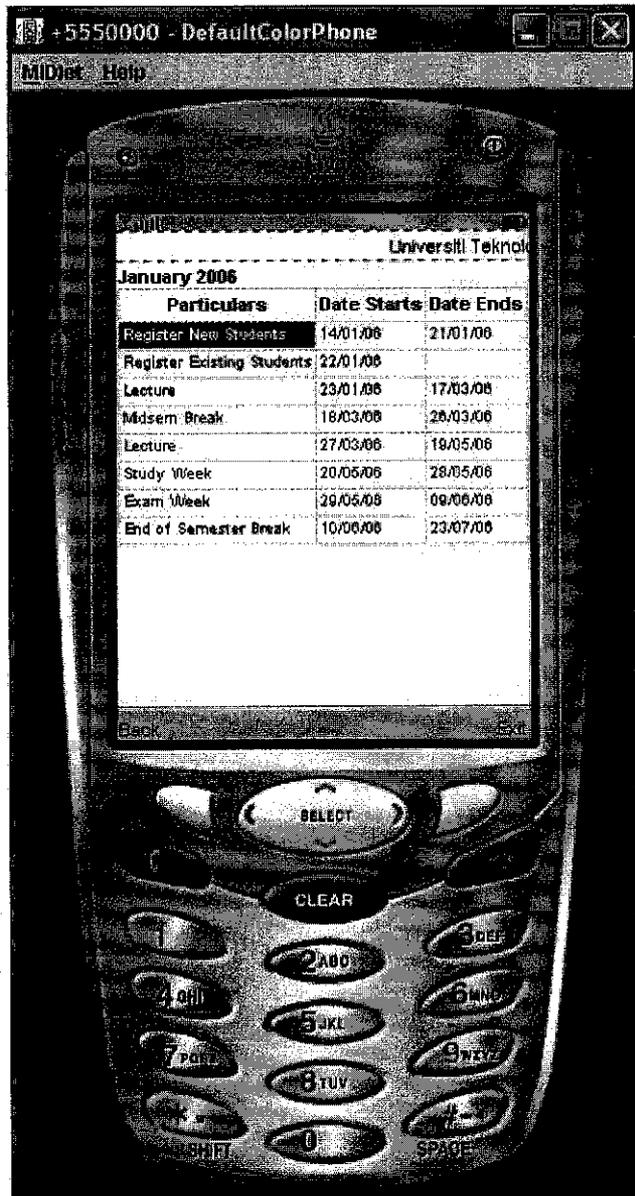
Figure 4.13: Screen Shot for Academic Calendar

4.4 EVALUATION (USER ACCEPTANCE TEST)

The user acceptance test is performed to verify the accuracy of the application to the users. This test is conducted to measure the reliability of the application.

The evaluation is conducted by ten students and tested on the student's module. From the needs and the requirements of this application, they are suitable to implement this testing part. However, the testing part is not implemented on the lecturer's module as they main objective is focused on the student's module.

The users have to run the application by themselves using the emulator. Then, comments are needed from them about the application. Observation about the users using the application is done to get the result. This evaluation is conducted in a controlled environment. After the testing part, the evaluation form is given and the users have to fill up the form to get their feedback.

The sample of evaluation form as below:

Table 4.1: Sample Evaluation Form

ATTRIBUTES	RATING				
	1	2	3	4	5
1. Realism of prototype					
2. Match between application and real world					
3. User control and freedom					
4. Visibility of application status					
5. Aesthetic and minimalist design					

The definition for the scale is:

1- Very Poor, 2- Below Average, 3- Average, 4- Meet Expectation, 5- Outstanding

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Each of the evaluation of the characteristics is explained to the testers, which are:

a) **Realism of prototype:**

The overall performance of the prototype

b) **Match between application and real world:**

The application should match the user's language, with words and phrases in the application

c) **User's control and freedom:**

The application supports the user to manage in using the application.

d) **Visibility of application status:**

Users are always be informed about what is going on

e) **Aesthetic and minimalist design:**

The content of the application and does not contained the irrelevant information.

4.4.1 Evaluation Results

The evaluation result could be summarized in **Table 4.2** below as:

Table 4.2: Summary of the Evaluation by Ten Users

USER/CRITERIA	Realism of prototype	Match between application and real world	User control and freedom	Visibility of application status	Aesthetic and minimalist design
1	4	3	2	3	5
2	3	3	3	3	3
3	4	3	2	4	3
4	3	4	2	4	2
5	4	3	3	2	4
6	3	4	3	3	2
7	3	4	2	2	4
8	4	3	2	4	2
9	4	3	4	2	3
10	3	4	3	3	4

The definition for the scale is:

1- Very Poor, 2- Below Average, 3- Average, 4- Meet Expectation, 5- Outstanding

4.4.2 Evaluation Results Analysis

The testers are pleased to give any comments or their opinions about the application after completed filling the evaluation form. All the comments and perspectives are welcomed in term of receiving the feedback from the developed project, especially for the future purposes in understanding more about the users' requirements and needs.

Average Evaluation Results

Criteria:

1: Realism of Prototype

2: Match between Application and Real World

3: User Control and Freedom

4: Visibility of the Application Status

5: Aesthetics and Minimalist Design
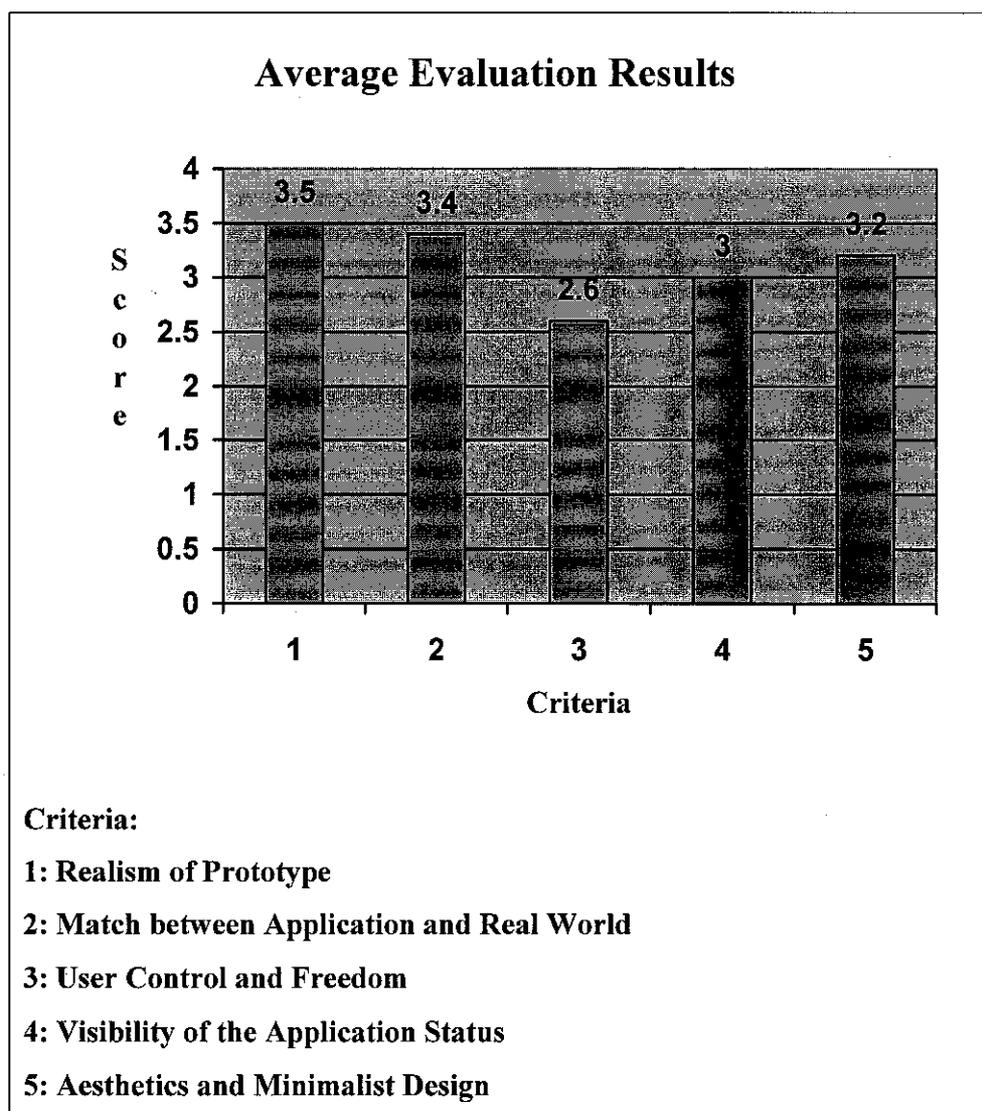
Figure 4.13: Average Evaluation Results of the Application

4.4.2.1 Realism of Prototype

The average score for this criterion is 3.5. From the feedback that had received, the users feel that the application is presentable and will be very useful, especially for the future purposes. However, some improvement and increment in functionalities are still needed.

4.4.2.2 Match between Application and Real World

The application's average score in this criterion is 3.4, which is an average. Most of them had agreed that this application still requires some of the improvement.

4.4.2.3 User Control and Freedom

For this criterion, the average score is in the range of below the average, which is 2.6. The application is not really gives the users the freedom of control, but only to the lecturers' module in term of security.

4.4.2.4 Visibility of the Application Status

For this criterion, the average score is 3.0, which is only the average and needs more improvement, in terms of reliability of the users to this application.

4.4.2.5 Aesthetics and Minimalist Design

All the users agree that the application contains all the relevant information that needed by the students. The interfaces and the design also are satisfied by them as the author is focused to the simplicity of the application.

The overall score that could be summarized is the average score from the evaluators. They satisfied with the time being but there are a lot more considerations that have to be taken in enhancing this application and make it useful. Although there are some drawbacks of this application, this technology on the mobiles is needed for the long term used.

CHAPTER 5

RECOMMENDATION AND CONCLUSION

5.1 Summary of Project

This project is delivered by implementing J2ME programming with SOAP and XML. Developing the application for the mobile is such a new experience for the author. In fact, the subject is learnt at the final semester of the author's study. In developing this project, there are also some drawbacks that the author has to face such as in difficulties in understanding the J2ME programming coding and connecting the data with the database. However, with the support from the lecturers, the author's supervisor and her colleague, the difficulties could be managed.

Besides developing this project, the researches are done, especially that related with this new technology through internet and reference books. Towards the completion of the prototype, the research and construction phase are the crucial part, especially in the defined scope, which can be useful for the future purposes.

Most of the objectives set on this project had been achieved at the end of this project in order to make it practical to the users and for the future purposes. Overall, this application will be very useful to the users, especially for the students and lecturers in UTP for future used when this technology is widely used.

5.2   Suggested Future Work for Expansion and Continuation

There are several suggestions and recommendations that could be done to this project and this prototype, so that in the future the functionalities and flexibility of this application will be increased. However, any enhancements later should be suitable for this application to be running in the mobile platform.

5.2.1   Add More Functions in the System

Currently, this application is only focused in checking the availability of the lecturers in UTP, whether the lecturers related are in or not. In fact, the students could also make appointments with the lecturers at their suitable and free time, in stead of waiting at the academic block; they could just go to the related time that agreed with the lecturers before. In fact organizing the appointments between the lecturers and the students, there are more functions that could also be added in Academic Organizer. For example, students also could check the availability of the laboratories so that they know which one of the laboratories is free for them to print notes, do assignments for students that do not have PC here and also to implement their laboratory experiments or FYP activities.

5.2.2   Apply to Other Departments As Well

Academic Organizer for this time is only focused in a small scope, which is in IT/IS department, meaning that only focusing to the lecturers in both programs as there are interrelated. To make it widely used in term of future purposed, the scope should be broadening to other departments as well. In fact, students from other programs could be also used this program, not only limited to IT/IS students only. To make this real, cooperation from all is needed.

5.2.3 Integrate with Other Applications

In fact, this application could also be integrate with other applications to add variety of functionalities and to make the users feel easier. For example, students could also do course registration or do confirmation using their mobility from other applications that had been developed. In the other words, it will look like the UTP website and the different is it runs on the different platform, which is the micro browser; in their handphones or PDAs. However, it is not an easy task, especially when to integrate two or more applications in a system. It is easier to develop more applications in a system than to integrate them. This is because many considerations have to be taken, especially their compatibility and flexibility with each others. Moreover, more time will be taken and testing stage will be conducted regularly to ensure its reliability.

In implementing all the future enhancements, many considerations have to be taken, especially when related to its function with the mobility. For example, too many functions that have to cramp in the mobile application are not appropriate and accurate as it will be constraints to the users. In fact, they want something simple but useful to them. In fact, phone compatibility and memory also have to be considered.

5.3   Conclusion

From positive point of view, Academic Organizer project should be able to give a lot of benefits to both parties, which are students and lecturers in lessening their daily workloads in campus life. Academic Organizer is able to help in managing the appointments between the both parties.

Academic Organizer is another alternative, especially in the communication area. It is quite widely used in the foreign country and tries to bring and give influenced to the Malaysians about this technology using mobile. However, Academic Organizer is not trying to replace the previous way in communication such as telephone and email. The only arising issues are about the delivery medium, which is not all the mobile phones could support this application and depends on the condition and specification of the hand phone itself. User's perceptions in accepting this new technology also one of the issues.

On the other hand, it is hopes that the result produces from this research and project could become as a point of reference to other developers for making the application to look perfect in every aspect and perspective.

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